

## 6 Public Page

Witten Technologies Inc. is developing a non-invasive system for detecting, mapping and inspecting steel and plastic pipelines. The system will combine measurements from ultra-wideband radar and electromagnetic induction arrays with precise positioning and advanced image processing. One component of the system—a radar that can produce 3D underground images up to 20 times faster than previous systems—is already in place and has been tested extensively in projects with major utilities, including several large projects with Consolidated Edison Co. of New York.

The major new work is the development of a novel array of 3-component induction sensors with inversion software to complement the imaging radar system. Ultrawideband radar (in the MHz range) and broadband induction (in the kHz range) should allow accurate mapping of steel and plastic pipelines in nearly all soil types, down to sufficient depths to cover most lines in place in the United States. The dual array will also be useful for mapping large areas to detect leaks.

A 6-channel prototype induction receiver system that records time-domain magnetic fields in the kHz range has been built. The prototype works in conjunction with multiple commercially available clamp-on transmitters that induce currents on buried pipes. Software has been developed to control the data acquisition and processes the data to determine the location of the pipelines. Field tests of the prototype were successful and validated the concept that will be used in the construction of the array induction system.

The design of a 48-channel array induction system has been finalized. The array consists of sixteen 3-component induction sensors, a data acquisition system capable of recording the 48 channels simultaneously and to resolve transmitted signals up to 200 kHz. This system will work (as the 6-channel prototype) in conjunction with multiple commercially available clamp-on transmitters that induce currents on buried pipes. Those components together with an appropriate power supply, survey wheel and counter electronics are assembled on a flatbed trailer for towed deployment behind a vehicle.

The induction receivers as well as the multi-channel data acquisition system have been purchased and tested. Software is being developed to control the 48-channel data acquisition and processes the data to determine the location of the pipelines. The next step is to perform field tests of the first full induction array system.

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